

UNITED STATES PATENT APPLICATION FOR

CONFIGURING NETWORK DEVICES

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BACKGROUND OF THE INVENTION

Field of Invention

5 The present invention pertains to the field of network devices. More particularly, this invention relates to configuring network devices.

Art Background

10 A wide variety of devices have been built in capabilities for network communication. A device capable of network communication may be referred to as a network device. Examples of network devices are numerous and include communication hubs, repeaters, routers, network bridges, computer systems, test
15 equipment, and distributed control system devices to name a few examples.

20 Typically, the installation of a network device includes configuring the network device with an appropriate set of communication parameters. For example, a newly installed network device is usually configured with its IP address as well as the IP addresses for other relevant devices.

25 A typical prior network device is configured using a computer system having a specialized application program which is adapted to the network device. The computer system usually connects to the network device via a serial connection or a network
30 connection. The specialized application program typically generates and transfers network configuration parameters to the network device via the serial or network connection.

Such specialized application programs are usually developed and maintained for a variety of different computer system platforms and operating systems. Unfortunately, the task of providing
5 software support for such specialize application programs usually increases the costs of network device configuration.

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SUMMARY OF THE INVENTION

5 A method is disclosed for configuring network
devices under control of a configuration server. The
configuration server loads an applet onto a node
which is connected to a local network. The applet
searches the local network for network devices. A
set of network configuration parameters for a found
network device is generated under control of the
10 configuration server. The configuration server then
transfers the network configuration parameters to the
applet which relays them to the network device via
the local network. The fact that control over the
configuration process resides with the configuration
15 server avoids the use of specialized application
programs for network device configuration.

20 Other features and advantages of the present
invention will be apparent from the detailed
description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is described with respect
to particular exemplary embodiments thereof and
5 reference is accordingly made to the drawings in
which:

Figure 1 illustrates an arrangement for
configuring a network device according to the present
10 teachings;

Figure 2 shows method steps performed by a
remote configuration applet in one embodiment;

Figure 3 illustrates a method for generating a
set of network configuration parameters for a network
15 device;

Figure 4 illustrates an arrangement for
20 configuring a set of network devices according to the
present teachings.

DETAILED DESCRIPTION

Figure 1 illustrates an arrangement for configuring a network device 40 according to the present teachings. The network device 40 is coupled to a local network 50. The network device 40 is configured using a node 12 which is connected to the local network 50 and which configures the network device 40 under control of a configuration server 10. The node 12 communicates with the configuration server 10 via a communication network 30.

In one embodiment, the communication network 30 may be the world-wide web of the Internet. Alternatively, the communication network 30 may be another communication network which supports the Hyper-Text Transfer Protocol (HTTP). In other embodiments, other client-server communication protocols may be employed. The local network 50 may be, for example, an Ethernet local area network.

In this embodiment, devices on the local network 50 communicate with devices on the communication network 30 through a proxy server 16. The proxy server 16 may provide firewall protection to devices on the local network 50. In other embodiments, the proxy server 16 may not be present.

The node 12 includes a set of hardware/software resources for executing a remote configuration applet 20 and a web browser application 22. The remote configuration applet 20 searches the local network 50 for network devices such as the network device 40

that are capable of being configured. The remote configuration applet 20 notifies the configuration server 10 via the communication network 30 when the network device 40 is found. The network device 40
5 may be undergoing an initial configuration or an update to its configuration.

The web browser application 22 generates a set of network configuration parameters for the network
10 device 40 under control of the configuration server 10. The configuration server 10 provides the network configuration parameters to the remote configuration applet 20 via the communication network 30. The remote configuration applet 20 relays the network
15 configuration parameters onto the network device 40 via the local network 50.

Once the network device 40 is provided with the network communication parameters, it may access other
20 devices such as the configuration server 10 using Internet protocols.

Figure 2 shows method steps performed by the remote configuration applet 20 in one embodiment. At
25 step 100, the remote configuration applet 20 searches for network devices that are connected to the local network 50. In this example, the network device found at step 100 is the network device 40.

30 In one embodiment, the remote configuration applet 20 searches for network devices using a multi-cast protocol. The remote configuration applet 20 generates a multi-cast query message and transfers it

via the local network 50. The multi-cast query message includes a header that targets multi-cast capable devices. Only multi-cast capable devices on the local network 50 respond to the multi-cast query message. The remote configuration applet 20 gathers data on the network devices on the local network 50 that respond to the multi-cast query message. A response from a network device to a multi-cast query message includes a set of current configuration information for the network device. When a network device responds to a multi-cast query message it indicates that the network device is capable of being configured.

In another embodiment, the remote configuration applet 20 searches for network devices on the local network 50 using the TCP/IP protocol.

At step 102, the remote configuration applet 20 notifies the configuration server 10 of the network device 40 found at step 100. For example, the remote configuration applet 20 may send a message to the configuration server 10 via the communication network 30 using Internet protocols. The message may include an identifier and/or related information for the network device 40.

Figure 3 illustrates a method for generating a set of network configuration parameters 64 for the network device 40 under control of the configuration server 10. The configuration server 10 generates a set of configuration web pages 60 in response to the notification at step 102. The web browser

application 22 enables a user to access the configuration web pages 60. The configuration web pages 60 guide the user through the process of generating the network configuration parameters 64.

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The configuration web pages 60 may include forms that enable a user to enter an address for the network device 40.

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The configuration web pages 60 may include forms that enable a user to enter an address for the configuration server 10.

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The configuration web pages 60 may include forms that enable a user to enter an address for other devices on the local network 50 such as the proxy server 16.

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In one embodiment, the addresses that may be configured for the network device 40 are IP address that will enable the network device 40 to communicate using Internet protocols. In other embodiments, other types of addresses may be configured depending on the type of communication involved.

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Alternatively, the configuration server 10 may automatically generate the network configuration parameters 64 without input by a user.

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At step 104, the remote configuration applet 20 obtains the network configuration parameters 64 from the configuration server 10. For example, the configuration server 10 may send a message 62 to the

remote configuration applet 20 via the communication network 30 using Internet protocols. The message 62 carries the network configuration parameters 64 along with a command that instructs the remote
5 configuration applet 20 to relay the network configuration parameters 64 onto the network device 40.

At step 106, the remote configuration applet 20
10 transfers the network configuration parameters 64 to the network device 40 via the local network 50. For example, the remote configuration applet 20 may send the network communication parameters 64 via the local network 50 using a multi-cast protocol.
15 Alternatively, the remote configuration applet 20 may send the network communication parameters 64 via the local network 50 using the TCP/IP protocol.

Figure 4 illustrates an arrangement for
20 configuring a set of network devices 70-72 according to the present teachings. The network devices 70-72 and the node 12 are coupled to the local network 50. The node 12 communicates with the configuration server 10 via the communication network 30 with or
25 without an intervening proxy server.

Any one or more of the network devices 70-72 may need to be configured. A user employs the web browser application 22 to access a network device
30 configuration web page 80 which is generated by the configuration server 10. The network device configuration web page 80 include a hyperlink that when selected loads the remote configuration applet

20 into the node 12 and executes it. The remote
configuration applet 20 searches the local network 50
for any of the network devices 70-72 that are capable
of being configured and reports the results back to
5 the configuration server 10. The user of the web
browser application 22 generates network
configuration parameters for the network devices
under control of the configuration server 10 as
describe above. The configuration server 10 sends
10 the network configuration parameters to the remote
configuration applet 20 which relays them onto the
network devices 70-71 via the local network 50.

In one embodiment, the remote configuration
15 applet 20 is a Java applet. The web browser
application 22 includes a Java virtual machine for
executing the remote configuration applet 20 in Java.

The node 12 includes hardware and software
20 resources and communication resources for executing
the web browser application 22 and the remote
configuration applet 20 and for performing
communication via the communication network 30 and
the local network 50. For example, the node 12
25 includes the capability of transferring multi-cast
query messages and detecting responses from network
devices. The node 12 may be embodied as a computer
system such as a personal computer or engineering
workstation with an operating system that supports
30 widely available web browser applications including
those that support Java applets.

The foregoing detailed description of the present invention is provided for the purposes of illustration and is not intended to be exhaustive or to limit the invention to the precise embodiment disclosed. Accordingly, the scope of the present invention is defined by the appended claims.